# User Manual for the Professional Electrochemical Station – 50A

## PRODUCT DESCRIPTION:

This Electrochemical Station is a high performance plating/forming station designed to plate, form, strip and clean multiple items using an electrochemical method. The station incorporates principles of modern design. It is entirely suitable for any type of electrochemical work with both conductive (metals) and non-conductive (glass, plastic, wood etc) materials. Electrochemical processes are widely used in many; industries, electronics, machinery, decorating, crafts, jewellery, arts, etc. The station is suitable for professional coating of all types of materials.

## ELECTROFORMING AND ELECTROPLATING:

Processes of electroplating are defined as covering any electricity conducting material with an adherent and durable film of metal. This is achieved by placing an object in a tank containing a solution of a specific metal and then performing an electrolytic action with the purpose of covering the object with the metal film. If the object you wish to plate is conductive then it can be plated directly.

The electrochemical station uses natural conductivity of the material to complete the electrolytic action that allows the plating process to work.

If, however, your object is non-conductive (i.e. glass, plastic, wood etc) the object must first be painted with: Graphite (soft materials), Copper (some types of plastic) or Silver (all materials) conductive paint so that the electroplating process can work.

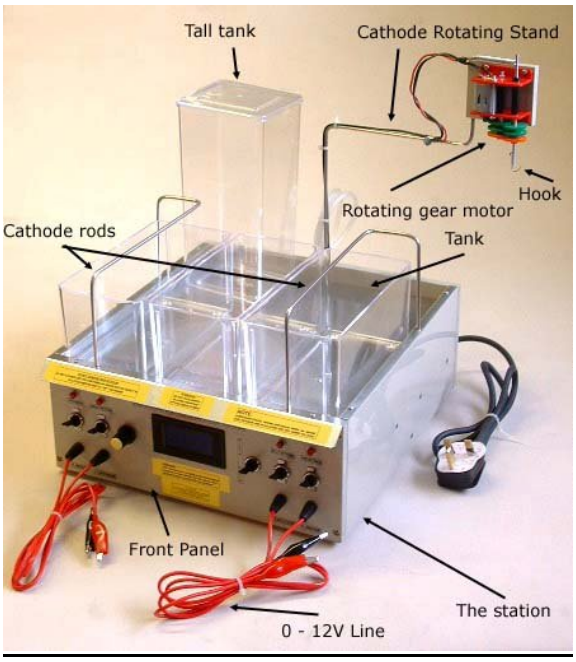
Once the cathode and the anode are submersed in the tank and covered by the solution and the station is turned on, an electric current will flow through the solution, which will cause the formation of an electric circuit and initiate the movement of the metal ions in the solution to transfer to the cathode. This will result in the coating of the cathode. At the same time, an equal amount of the same metal is discharged from the anode into the solution.

## TECHNICAL SPECIFICATIONS:

| | |
|---|---|
| **Model** | **HSEPS** |
| **Input voltage** | **110V – 240V ac** |
| **Output Voltage** | **0-15Vdc** |
| **Output Amperage** | **0-50Adc** |
| **Agitation system (air)** | **Yes** |
| **“Keep solution hot” system (hotplate)** | **Yes** |
| **Power of heater** | **1200 Watt** |
| **Air pump** | **1 x 72 L/Hour** |
| **CRS (Cathode Rotating Stand)** | **1** |
| **CRS speed** | **15 RPM** |
| **Plating plastic containers** | **4** |
| **Dimensions of station (mm)** | **315W x 335D x 280H** |
| **Weight** | **4.4 Kg** |

## PERFORMANCE:

The station can be used on either 110 V-240 V. It uses a current from 0A (dc) to 50A (dc) and produces a voltage between 0V and 15VDC. It allows cleaning, plating or forming of gold, rhodium, copper, nickel, zinc, brass, bronze, silver, bismuth, and other metals and alloys.




## DELIVERY SPECIFICATION:

Please check your delivery includes the following components:

- The station;
- Black and red leads with crocodile clamps (for Anode & Cathode);
- 1 stainless steel anode for gold, silver plating/stripping and cleaning processes;
- 4 horizontal plastic containers for testing purpose.

*If the station that you receive looks different from the model you have seen before please do not worry. You can be assured that any changes that have been made are solely made with the purpose of improving quality, appearance and specifications of the plating station in accordance with our commitment to a continuous improvement process which is based on the feedback provided to us by our clients.*

## TERMINOLOGY:

**Anode and Cathode:** Throughout the User Manual we refer to the terms anode and cathode a lot. Please do not be put off by this. **AN ANODE** is the piece of metal in the tank which should be connected to the plus "+" or positive power and **A CATHODE** is the object that needs to be plated and that should be connected to the minus "-"or the negative power.

**CRS (Cathode Rotating Stand)**: is a motor with a small hook on a metal arm in the middle of this station. It is widely used to rotate the cathode in the tank. The Cathode Rotating Stand will allow you to gain the best finish possible with this station. The principle is simple, i.e., instead of the object remaining static in the tank it is rotated slowly in the solution ensuring even coverage and hence, a spectacular finish. To connect the CRS plug the negative (black) wire into the left or right black

socket on the front panel and clip the crocodile clip clamp to a screw on the top of the motor's stand (please see pictures below). DO NOT FORGET to plug in a positive (red) wire into a left or right red socket. Using the crocodile clip clamp connect the red wire to an anode (it can be found in the tank placed under the CRS motor). Use this rotating stand when you require a high quality plating surface or for electroforming processes. NOTE: Make sure the object is fully immersed into the solution and does not touch the anode whilst rotating.

**Air agitation system:** consists of a small air pump and a clear PVC tube, with a 8 mm diameter, with a plastic plug and micro-holes on its end that should be placed in the tank with the solution. Air from a small air pump (previously installed inside the station) goes via this tube to the end with micro-holes. Small bubbles will be seen formed in your solution. It is a very important option that allows you to mix a solution in process (and to perform the required process much faster). This option also allows your chemicals to work longer and to achieve better results quicker.

**Heating system**: This new model is supplied with an integral heating element located under the top metal lid for a heating option. This heating element is very powerful, allowing you to maintain a a warm solution within the tank. It is a safe heating option as it is provided with an automatic cut-off switch that disconnects the heating element automatically should the temperature reach more than 70C. This will protect your station, plastic tanks and solutions from overheating by keeping them at an optimal operating temperature at all times.

**DC power cut-off system:** this model has an overload DC power cut-off system that allows the station to remain in full working order if an accidental short circuit occurs. (Connect an anode and cathode together in a solution for period of up to 20 seconds).

**Coating Quality:** is a complex function and depends on the electric current, voltage, solution temperature, exposure time, correct position in the solution, distance between an object and an anode, shape of plating/forming object, solution quality and your experience so you may require additional training or skills to plate/form some materials.

## INSTALLATION AND OPERATION:

The installation and operation of this station does not require prior knowledge or specific training. Just install a CRS on back panel (please see "Assembly") and connect this station to a power supply. Now it is ready to use.

To start electroplating / electroforming you will also need the following:

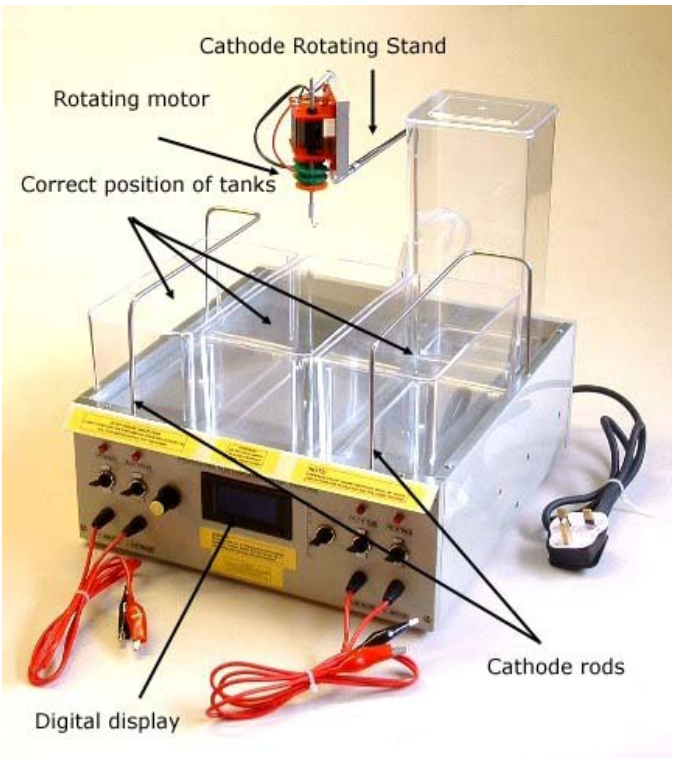
- Sufficient amount of distilled or deionised water (water from car acid batteries is suitable).
- Electro cleaning salt suitable for any plating process.
- Plating/Forming chemicals depending on the plating process.
- Copper or aluminium wire to connect objects to the cathode rods or to the CRS hook.
- Rinsing water in a glass or a plastic container or, alternatively, easy access to tap water.

## POSITIONING:

After making sure that you have all the above mentioned items at your disposal, place the station in a suitable level position. Please ensure that the place where you intend to use your station is able to support the entire weight of the station (10 kg). It is best to make sure that a good source of rinsing water is located next to the station and good ventilation is accessible.

**ASSEMBLY:**

Each CRS is mounted on a steel rod and packed separately. Please note that the CRS is also connected to the station by a cable. Please place the opposite end of the rod (one without a motor) into its locating hole (in the middle of the back panel of the station). If you wish to use a tall tank (it can be used only with a CRS) you can place it anywhere around the station because the CRS can be moved around. The correct position is when the CRS motor is located on the top of the tank.




**PRIMING:**

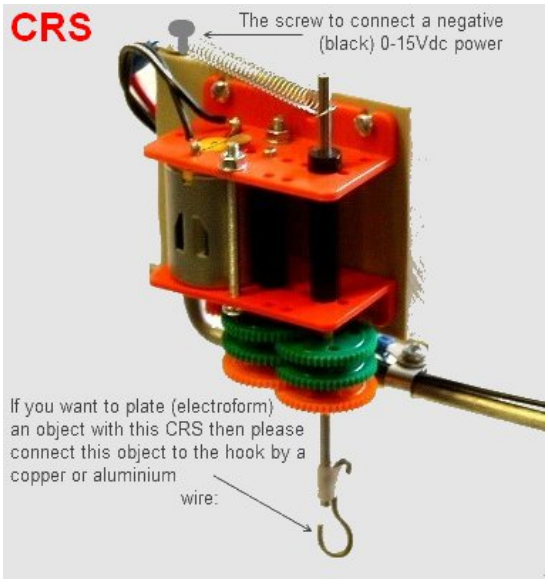
Dissolve the chemicals in a correct amount of warm (about 40-70C) distilled water, stir them very well and pour the solutions into the tanks (capacity of each plastic container is about 0.5 L). For example, fill the left horizontal tank ¾ full with the cleaning solution and the second horizontal tank with tap water and the right horizontal tank with the plating solution. (You can also use all tanks in different ways, for example, for cleaning or plating/forming solution in all three tanks). Attach anodes to the walls of these tanks. The station is supplied with a stainless steel anode suitable for rhodium, gold and silver plating/stripping processes as well as for cleaning purposes. Simply hook it on the side of the tank immersed into the solution. The anode should be twice the size of the object which is to be plated or stripped. This is dependant on the plating process used, with gold, copper, chrome, etc., the anode material will vary. If the object you wish to be plated is large then you can use 2 or 4 anodes around the tank.
Please note also that you can reset Ampere or Voltage display at any time by pressing a small button on the right bottom corner of the digital display.

Top Tip:

NEVER HEAT ANY SOLUTION TO A TEMPERATURE HIGHER THAN 80 °C. OTHERWISE, IT WILL DAMAGE YOUR CHEMICALS! THE TEMPERATURE FOR ANY PLATING / FORMING CHEMICAL SOLUTIONS IS BETWEEN 40-70° C.

## PREPARATION:

To prepare your items for electroplating or electroforming it is important to ensure that all oil, grease, paint, old layers or other materials are removed prior to processing. The most common cause of poor quality plating or forming is insufficient preparation. The usage of an ultrasonic cleaner is excellent for the purpose of removal and polishing compounds. However, vigorous brushing with soapy water may also be sufficient. You may also want to electro-clean them in your station. This electro-cleaning process takes just from 5 to 30 minutes and this is a very short period of time compared to the time you may lose trying to plate an object which is not sufficiently clean. In order to perform a cleaning process, the object that is to be plated should be hung on copper or aluminium wired hooks to the cathode rods or to CRS. The cathode wire (black) should then be attached to the cathode rod or CRS (please see an illustration). Please make sure that the item(s) is fully immersed in the cleaning solution and has good contact with the CRS hook or with the cathode rods. Now, connect a stainless steel anode (positioned in the tank with the cleaning solution) by a crocodile clip clamp to a positive (red) wire and plug this wire into a red left or right socket on the front panel. Then, move the main ("Plating – Stripping") switch to the "Plating" position and turn the potentiometer (positioned under this main switch) to a required voltage (usually about 7-9 Volts) and commence the process. You can repeat this procedure as many times as you require and clean at the same time while other objects are processed. **HOWEVER: You can place just ONE object on a CRS**.


CRS
The screw to connect a negative (black) 0-15Vdc power
If you want to plate (electroform) an object with this CRS then please connect this object to the hook by a copper or aluminium wire:

## BEFORE YOU BEGIN:

Prior to switching the station on, make sure that the potentiometer (i.e. the volume control, the bottom knob on the middle of front panel) is fully turned anticlockwise. To supply a voltage to a cathode rod you need to use the black wire on the front panel. Please plug the black (negative, "-") wire by a

crocodile clip clamp to one of cathode rod on your station. You can use either one of the electrical lines, whichever is more suitable for your work.

Now use the red (positive "+") wires on the front panel to establish the connection to the anode in the tank. The red crocodile clip clamp should be clipped to the metal plate, which should be attached to your anode, once it has been inserted in the tank. Now just connect the object(s) you would like to plate, clean, strip or to form by hook(s) made of copper or aluminium wire to the cathode rods (or CRS) and make sure that all the item(s) are fully immersed in the solution and have good contact with the cathode rods or with CRS.

Top Tip:
BEFORE YOU BEGIN MAKE SURE THAT THE ANODE AND THE OBJECT TO BE PLATED ARE FULLY IMMERSED IN THE SOLUTION AND DO NOT TOUCH EACH OTHER AS IT CAN DAMAGE YOUR STATION!

**INSTRUCTIONS:**

1. Switch the station "On" by flipping the "Power" switch down. The digital display on the front panel will light.

2. Switch "On" the "Heating" option. It is safe to leave it "On" throughout the day and will keep the solutions at an optimal temperature all the time. You will begin to hear a click every few minutes. It means that your heating system has started to work. The top metal plate on your station (where all the tanks are placed) will get hot over time. Please do not touch it with your hands without gloves! NOTE: this heating system is designed to keep water WARM and not to HEAT it. Hence, the solution will need heating up to 70 C before filling the tank, for instance when you stir water containing chemicals.

3. Now turn the potentiometer (voltage control) clockwise until the correct voltage is shown on the digital display. The required voltage for your process can be found on the data sheets for the solution, on internet or by tests. Please note also that you can change the Ampere or Voltage display at any time by pressing on a small button on the right bottom corner of this digital display.

4. If required, switch "On" the "Agitation" system by placing the end of the plastic tube in the tank and small bubbles in your tanks will be formed that will help you save both, your chemicals and your time during the plating process.

Now you may start any electro cleaning, plating, stripping or forming process you choose. Move the central (Plating – Stripping) switch on the front panel to "Plating" (for electroplating, electroforming and cleaning processes) position or to a stripping position depending on which operation you are performing and initiate the process.

**If you find cleaning, electroplating, electroforming or stripping processes challenging please feel free to contact us regarding electroplating courses for beginners conducted either on-line or in-person**

## STRIPPING:

This process is used to remove all residues or unwanted plates from a previously plated object.

For this process you will need to hang the object you are stripping on hooks made of copper or aluminium wire to the cathode rods (CRS) and attach the black wire to the cathode rods (CRS).

Please make sure that all the item(s) are fully immersed in the solution and that they have good contact with the CRS hook or with the cathode rods.
There is no need to reverse the polarity of the cables as stated on the data sheets when using the stripping option as the station does this for you. Simply turn the main switch to "Stripping" position and the process will begin.

## BRUSHES AND PENS:

The electrochemical station has two electrical lines (outputs) enabling one to perform two electroplating processes in parallel with two tanks or to use a Pen or Brush plating device on the second output.

Connect the pen or brush to the "+" (red) and "–"(black) sockets on the front panel using the red lead attached to your external device.

Now connect the black lead to the black socket and using a crocodile clamp connect it to an object that is to be plated.

Note that the anode (brush/ pen) is always connected to the "+" (red) connection and the cathode is always connected to the "–"(black) socket.

## HEALTH AND SAFETY:

TAKE EXTRA CARE as there are two main hazards: electrical injuries and poisoning by solutions and their gases.
To avoid electrical injuries, DO NOT touch any exposed leads of the station with unprotected hands. Always use rubber gloves. This will also protect your hands from the harmful effects of the solutions. It will also be necessary to provide a rubber mat to stand on in the operation area.
The chemicals which you will work with are hazardous; many of them are deadly poisons and their combinations often produce corrosive and poisonous gases.
Therefore, all general safety precautions should be undertaken when working with them including keeping all chemicals inaccessible to children, wearing eye protection, avoiding skin contact, wearing latex gloves and avoiding inhalation.
Ventilation of your work area should be your number one priority otherwise damaged health is probable to occur.
The appropriate rules of working with chemicals are provided by the suppliers of every chemical.
**Please follow all instructions carefully.**